

## CLAIMS

What is claimed is:

1. An apparatus comprising:
  - at least one network interface for coupling the apparatus to at least one network;
  - a packet header analyzer coupled to the network interface;
  - a detected device list coupled to the packet header analyzer;
  - a weight definition store to store respective weight values for a plurality of packet characteristics;
  - a weight calculator coupled to the packet header analyzer and to the weight definition store;and
  - a packet weight history store coupled to the weight calculator.
2. The apparatus of claim 1 further comprising:
  - a control interface for receiving commands.
3. The apparatus of claim 2 further comprising:
  - the control interface being adapted to connect to a command link which is physically distinct from the at least one network.
4. The apparatus of claim 2 wherein the control interface comprises:
  - an SNMP interface adapted to receive SNMP commands over the least one network.
5. The apparatus of claim 1 further comprising at least one of a network switch, a network hub, and a network router.
6. The apparatus of claim 5 wherein the at least one network interface comprises at least two network interfaces.
7. A network communication system comprising:
  - a plurality of N network devices;
  - a plurality of M metering devices, wherein the ratio of M:N is in the range of 1:2 to 1:512,and wherein each metering device is coupled to at least one of the network devices; and

5 a server coupled to the metering devices to roll up metering reports from the metering  
6 devices.

1 8. The network communication system of claim 7 wherein the ratio of M:N is in the range of  
2 1:4 to 1:128.

1 9. The network communication system of claim 8 wherein the ratio of M:N is in the range of  
2 1:8 to 1:32.

1 10. The network communication system of claim 7 wherein at least two of the metering devices  
2 are coupled to respective different numbers of network devices.

1 11. The network communication system of claim 7 wherein at least some of the metering devices  
2 each comprises:

3 a packet header analyzer;

4 a detected device list coupled to the packet header analyzer; and

5 a packet weight history coupled to the detected device list.

1 12. The network communication system of claim 11 wherein the at least some of the metering  
2 devices each further comprises:

3 a weight definition store; and

4 a weight calculator coupled to the weight definition store, the packet weight history, and the  
5 packet header analyzer.

1 13. The network communication system of claim 12 wherein at least some of the metering  
2 devices each comprises at least one of a network switch, a network hub, and a network router.

1 14. The network communication system of claim 7 wherein at least some of the metering devices  
2 each comprises at least one of a network switch, a network hub, and a network router.

1 15. A method of operation of a metering device, the method comprising:  
2 determining an identification of a network device sending or receiving a packet;  
3 if the identification of the network device is not already stored in a detected device list,  
4 adding the identification of the network device to the detected device list; and  
5 for each of at least one packet characteristic of the packet,

6 reading a weight definition of that packet characteristic from a weight definition store,  
7 calculating a weight for the packet, and  
8 updating a packet weight history.

1 16. The method of claim 15 wherein each of the at least one packet characteristic comprises one  
2 of:

3 communication protocol;  
4 packet size;  
5 time that the packet was sent;  
6 time that the packet was received;  
7 current average network throughput;  
8 current peak network throughput;  
9 total amount of data transferred;  
10 total amount of data transferred since some particular time;  
11 total amount of data transferred since some particular event;  
12 number of packets transferred that are in a given size range;  
13 traffic to particular addresses or ports or networks or sub-nets or network devices;  
14 traffic from particular addresses or ports or networks or sub-nets or network devices;  
15 average percentage of network utilization;  
16 peak percentage of network utilization;  
17 average number of TCP sessions open;  
18 peak number of TCP sessions open;  
19 average traffic level of a particular protocol;  
20 average traffic level of a particular protocol; and  
21 percentage mixes of specified protocols among the current network traffic.

1 17. The method of claim 16 further comprising:  
2 redefining the weight definition in the weight definition store, of at least one packet  
3 characteristic.

1 18. A method of metering communication network traffic, the method comprising, at each of M  
2 metering devices variously coupled to respective ones of N network devices:

3 receiving packets from network devices;  
4 analyzing packet headers of the packets; and  
5 in response to the analyzing, updating a weighted packet history; wherein  
6  $N > 4$ ,  $M > 2$ , and  $M:N$  is in the range of 1:4 to 1:128.

1 19. The method of claim 18 further comprising:  
2 rolling up metering reports from the  $M$  metering devices to at least one central server.

1 20. The method of claim 19 further comprising:  
2 for each of at least one packet characteristic identified in the analyzing for a packet,  
3 determining a weight definition for that packet characteristic,  
4 calculating a weight for the packet, and  
5 using the calculated weight in the updating of the weighted packet history.

6 21. The method of claim 20 wherein each of the at least one packet characteristic comprises a  
7 respective one of:

8 communication protocol;  
9 packet size;  
10 time that the packet was sent;  
11 time that the packet was received;  
12 current average network throughput;  
13 current peak network throughput;  
14 total amount of data transferred;  
15 total amount of data transferred since some particular time;  
16 total amount of data transferred since some particular event;  
17 number of packets transferred that are in a given size range;  
18 traffic to particular addresses or ports or networks or sub-nets or network devices;  
19 traffic from particular addresses or ports or networks or sub-nets or network devices;  
20 average percentage of network utilization;  
21 peak percentage of network utilization;  
22 average number of TCP sessions open;  
23 peak number of TCP sessions open;

average traffic level of a particular protocol;  
average traffic level of a particular protocol; and  
percentage mixes of specified protocols among the current network traffic.

22. The method of claim 20 further comprising:  
altering the weight definition in the weight definition store, of at least one packet  
characteristic.

23. An article of manufacture comprising:  
a machine-accessible medium including data that, when accessed by a machine, cause the  
machine to,  
analyze a packet header of a packet,  
identify a first network device which sent the packet,  
identify a second network device to which the packet was sent,  
if the first or second network device is not already identified in a detected device list,  
adding the first or second network device to the detected device list,  
for each of at least one packet characteristic of the packet,  
calculating a weight for the packet, and  
updating a packet weight history for that packet characteristic of that packet in  
a packet weight history store.

24. The article of manufacture of claim 23 wherein the machine-accessible medium further  
includes data that cause the machine to:  
reset at least some content of the packet weight history store.